REMARKS

Status of the Claims

In the Office Action, claims 1-18 were noted as pending in the application. Claims 1-18 stand rejected.

A. Summary of Cited References

Before addressing the Examiner's rejections, a brief summary of the cited references is provided.

U.S. Patent Applicant number 20010032334 to Dapper, et. al., ("Dapper")

Dapper relates to a method and system for synchronizing the tuning of transmitters and receivers used in an orthogonal frequency division multiplexing arrangement. [0167]. A host digital terminal ("HDT") communicates with a plurality of integrated service units ("ISU") at customers' locations. Id. An ISU estimates a frequency error digitally from downstream signals and a correction is applied to the up stream data being transmitted. [0317]. Dapper describes this in contrast to determining an error correction at the HDT using carrier amplitude timing recovery block 222. Id. Recovery block 222 receives digital signals from analog to digital converters 212 as shown in FIG. 26. Thus, in either scenario, Dapper illustrates estimating an error for use in correcting mixer frequency differences between the HDT of ISU. The error is used, for example, to adjust upstream signals transmitted from the ISU based on a difference, digitally computed at the ISU, between the HDT and ISU oscillators. [0318] – [0319]. Thus, after correction, the RF mixers at both the HDT and ISU are "frequency locked." Id.

U.S. Patent Applicant number 20030215011 to Wang, et. al., ("Wang")

Wang relates to transcoding an input compressed video bitstream to an output compressed bitstream at a different rate. Section [0294] discusses that dequantized data presented to transcode block 400a will differ from the DCT coefficients emerging from dequantizing block 420. Differencing block 425 processes the difference between the dequantized data and the DCT coefficients and produces an error-image that represents the quantizing errors in the final output video bitstream. The error-image is stored into frame buffer FB2 440. The error image is then offset by ½ the dynamic range of FB2. Section [0295] points out that this is merely one of many biasing techniques that can be used to handle numerical conversion where numbers of different types are to be comingled.

B. Objection to claims 1, 6, 8, 10, 12 - 16, and 18

Applicant has amended the claims above to overcome Examiner's objection. Withdrawal of the objection is respectfully requested.

C. Rejection of Claims 1-4 and 7 under 35 U.S.C. § 102(e).

On page 2 of the Office Action, claims 1-4 and 7 are rejected under 35 U.S.C. § 102 as being anticipated by Dapper. The reasons that the claims patentably distinguish over the reference are addressed below.

Claim 1, as filed, recites ". . . determining a frequency offset based on the difference between the actual currently tuned frequency and the desired frequency;

digitizing the frequency offset into a frequency offset word; and

tuning the communication device by adjusting the actual currently tuned frequency by the frequency value corresponding to the frequency offset word."

Dapper does not disclose the claim elements recited in claim 1.

As described in the present application, a cable modem ("CM") receives an instruction from the cable modem termination system ("CMTS"), to which it is coupled, to tune to a specific channel frequency. Page 2, line 7. Thus, the CM receives a message that instructs tuning to an exact frequency; the CM does not have to estimate the frequency to which it is commanded to tune.

However, as the present application also discloses, the CM converts the tuning instruction into a digital word of a predetermined bit length. Since the tuning instruction word is a specific number of bits, it can only represent a finite number of different frequencies. In other words, the frequency resolution with which the CM can tune its transmitter's carrier frequency is limited by the number of bits in the instruction word. Also, as described in the present application, the CM's tunable frequencies are also dependent on the CM's internal digital clock speed. Page 2, lines 19-20. Thus, a given resolution to which a CM can tune its RF carrier frequency results from the limitation imposed by the frequency word bit length and the internal clock and any clock multiplier it may use

When a CM attempts to tune to the frequency desired by the CMTS, it tunes to the closest actual frequency to the desired frequency. The present application refers to the difference between the actual and the desired frequency as δ. From time to time, the CMTS may instruct that the CM adjust its tuned frequency. The CMTS instructs the CM to do so by transmitting a tuning frequency offset ΔF. The CM converts the ΔF instruction into a frequency word, or a frequency offset word, according to the same algorithm used to convert any other instruction to tune to a given frequency.

Instead of incurring a tuning error of δ, as the current state of the art methods do by applying a quantized value of ΔF to the current <u>desired</u> frequency, the algorithm recited in claim 1 results in only a $\frac{1}{2}\ \delta$ tuning error maximum. This reduction by 50% of the tuning error results from applying the quantized offset value of ΔF to the <u>actual tuned</u> carrier frequency, which the CMTS used to calculate ΔF in the first place (page 5, lines 7-9). Thus, any truncation, or quantization, error will never exceed $\frac{1}{2}\ \delta$ using the method claimed in claim 1.

Now addressing the claim elements one-by-one, Dapper does not teach "determining a frequency offset based on the difference between the actual currently tuned frequency and the desired frequency . . . ." Indeed, Dapper discusses that the ISU estimates the percent difference between the oscillator frequency at the ISU and the oscillator frequency at the HDT, which an ISU digitally derives from the HDT downstream signal's carrier frequency. As Examiner is aware, a communication device typically tunes to a carrier frequency instead of to a fixed oscillator frequency. Thus, one skilled in the art would know that the communication device of claim 1, as recited above in this section, tunes to a carrier frequency, not to a fixed oscillator frequency. Applicant has amended claim 1 to make clear that a carrier frequency, not a mixer frequency, is being tuned by the communication device.

Notwithstanding that Dapper discusses estimating the oscillator frequency error of an RF mixer rather than estimating a carrier frequency resolution error, Dapper discusses estimating the error based on a percent difference between the respective mixer oscillator

frequencies at the HDT and ISU. Dapper does not discuss an error that is based on a resolution error imposed by the number of bits in a frequency instruction word. In making an obviousness rejection, which is addressed in the next section herein, Examiner stated that section [0533] discloses quantizing error. Whatever section [0533] does disclose, it does not disclose that that frequency instruction value is quantized into a frequency offset word. Section F below discusses in more detail the teachings of [0533] Dapper with respect to the obviousness rejection.

Applicant understands that the process of quantizing analog values into digital values is understood by those skilled in the art. However, the element of digitizing the frequency offset into a frequency offset word is one of multiple elements used in the novel combination recited in claim 1, for which Applicant seeks a patent. Furthermore, the doubling of a quantizing error could be present in the Dapper device, but apparently is not something that poses a problem to its operation. As discussed above, the resolution error in a system using the claimed subject matter never exceeds ½ δ. This possib;e higher error in Dapper vis-à-vis the limit of ½ δ achieved by implementing the method recited in claim 1 further supports the position that Dapper does not disclose a method for correcting double quantizing error.

Lastly, claim 1 recites "adjusting the actual currently tuned frequency by the frequency value corresponding to the frequency offset word." As discussed above, Dapper does not disclose determining a frequency offset word. Furthermore, Dapper does not disclose basing a frequency offset word on an actual tuned frequency rather than a difference between local mixer oscillator frequencies at the HDT and ISU. Therefore, Dapper cannot disclose adjusting the tuned frequency by a value corresponding to a frequency offset word.

Accordingly, since Dapper does not disclose all of the elements recited in claim 1, withdrawal of the rejection is respectfully requested. Since claims 2-7 depend from claim 1, Dapper does not anticipate them either. Withdrawal of the rejection is respectfully requested.

Although examiner has rejected independent claims 8 and 14 as obvious over Dapper in view of Wang, Examiner cites Wang to assert that certain elements not present in claim 1, but recited in claims 8 and 14, are disclosed in Wang. Applicant addresses the applicability of Wang below, but similar analysis as made above with respect to elements recited in claim 1 applies to similar elements recited in claims 8 and 14. Therefore, with respect to these similar claims, Applicant requests withdrawal of the rejection of claims 8 and 14 because all the elements are not found in the references, either alone or in combination; this same request is restated below in section F.

D. Rejection of claims under 35 U.S.C. § 103(a).

Beginning on page 5 of the Office Action, claims 5 - 6, 8-18 are rejected under 35 U.S.C. § 103 as being obvious over Dapper in view of Wang. The reasons that the claims patentably distinguish over the reference are addressed below.

E. The Claims are not Obvious over the Cited References

Applicant respectfully submits that the subject matter of the claims patentably distinguish over the cited references. Under MPEP § 2142, for an examiner to establish a *prima facie* case of obviousness, "three basic criteria must be met. First, there must be

some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure." If any of these three criteria are not met, the Examiner has not met the burden of establishing a *prima facie* case of obviousness, and the rejection should be withdrawn.

Furthermore, each dependent claim includes all of the limitations of the independent claim from which it depends. If an independent claim is non-obvious under 35 U.S.C. § 103, then any claim depending therefrom is non-obvious. MPEP §2143.03, citing In re Fine, 837 F.2d 1071 (Fed. Cir. 1988). Applicant respectfully submits that the burden of establishing a *prima facie* case of obviousness has not been met.

F. Claims are not obvious over the cited references

Addressing the obviousness rejection of the independent claims first, Applicant does not disagree with Examiner's citation to [0294] of Wang inasmuch as this section discusses storing information. Moreover, Applicant does not disagree that Wang discusses storing an error-image. Indeed, applicant does not deny that information of any type may be stored and used later.

However, Applicant disagrees that storing a difference between two differently calculated DCTs renders claim 5 obvious. Specifically, claim 5 recites ". . . wherein digitizing the frequency offset results in truncation, or quantization, error, and wherein the truncation error is stored." As one skilled in the art understands, DCTs in video streams are comingled with other image frames, thus avoiding the need to store every image frame.

In contrast, the present application teaches and claims applying a tuning error to a desired-to-be-tuned frequency to avoid cumulative error. Thus, the claimed method stores the error for application to a commanded frequency. Wang does not teach storing a frequency error for applying to a commanded frequency.

Notwithstanding that Wang does not disclose the recited element of storing a truncation error of a frequency offset, one skilled in the art of reducing radio tuning error would not have reason to review Wang, a patent related to video compression, and therefore the Wang reference does not render claim 5 obvious.

Furthermore, section [0533] of Dapper, which Examiner has cited, teaches away from the elements of claims 1 (the elements are included in claim 5) and 5, because section [0533] teaches that instead of using a clever software solution to determine by what value to offset a frequency, one can reduce error by just increasing the number of bits used. Naturally, if Applicant were to follow the teaching of Dapper [0533], new integrated circuitry could be used that uses more than 24 bits, but this would be more costly than using the current integrated circuit. Indeed, avoiding the use of an integrated circuit with more bits is the problem solved by the claimed subject matter. Instead of using more bits to achieve greater resolution, Applicant has devised a clever way of reducing error without increasing bit numbers. Thus, since Dapper teaches away from the elements recited in claims 1 and 5, the references, either alone, or in combination, do not

teach all of the elements recited in the claim.

Moreover, claim 1 does not stand rejected as obvious. Therefore, claim 5, or any of the other claims that depend from claim 1 cannot be rejected as obvious, as discussed above in reference to the citing of In re Fine in MPEP §2143.03. Withdrawal of the rejection is respectfully requested.

With respect to claim 6, Examiner correctly states that Dapper and Wang do not disclose that a stored truncation error is used to facilitate generating the frequency offset message if the offset word is to be applied to the currently commanded frequency instead of the actual frequency. Examiner incorrectly states that AAPA teaches the same. For the record, Applicant does not accept Examiner's characterization of discussion in the Background section of the present application as prior art. Disagreement as to characterization notwithstanding, the section cited by Examiner in the Background of the present application states that the current method used in the art applies a frequency offset ΔF to the currently desired, or commanded, frequency. This induces the problem that the claimed method solves; that is, the problem of cumulative error, because the actual tuned frequency may include an error δ and adjusting the tuned frequency by ΔF can further add to the error.

However, the claim claims using the error to facilitate generating the offset word. The claim does not claim applying the offset word to the actual tuned frequency, as the examiner stated. Therefore, since Dapper and Wang do not teach the recited element of using the stored offset word to generate a frequency offset message, the references do not render claim 6 obvious. Furthermore, under MPEP § 2142, as discussed above, Examiner may not rely on Applicant's disclosure to show a suggestion or motivation to combine references, as Examiner has done in conclusorily stating that "[i]t would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the teachings of Dapper and Wang, in order to generate a frequency offset message, as taught by AAPA in order to have a simple and easy protocol to allow the devices to communicate frequency adjustments." Examiner has improperly used what he characterizes as AAPA as a guide to showing why one would combine the references. In addition, claim 6 does not claim a protocol for communicating frequency adjustments. Withdrawal of the rejection is respectfully requested.

With respect to the rejection of claim 8, Examiner rejects the claim, stating that the previously cited sections teach the elements, because Dapper teaches that each end of transmitting and receiving devices have mixer oscillators oscillating at the same frequency. As discussed above, a radio, which the portions of a CM and CMTS related to the present subject matter include, tunes to a frequency that another radio device is tuned to in order to communicate with the other. Thus, as discussed above, Dapper does not teach adjusting a currently tuned frequency, because using the downstream oscillator to determine the oscillator frequency of a mixer oscillator located at another device, and thus tuning the other oscillator accordingly is not the same as determining a currently tuned radio carrier frequency and then adjusting it.

In addition, similar analysis applies as discussed above with respect to section [0533] of Wang (increasing bit number rather than reducing error through efficient software) teaching away from the claims.

Furthermore, Examiner states that AAPA teaches determining, at a CMTS, the actual upstream transmission frequency of the cable modem. The section cited by

examiner, [0008], does not mention that the CMTS determines the actual currently tuned frequency. Thus, Examiner should not have rejected claim 8 as obvious. As discussed above in section Withdrawal of the rejection is respectfully requested.

Regarding the rejection of claim 9, similar analysis as discussed above in connection with claim 8 applies. In addition, Dapper does not discuss applying a frequency offset word to a currently tuned frequency word. Withdrawal of the rejection is respectfully requested.

Regarding the rejection of claim 10, similar analysis as discussed above in connection with claim 8 applies. In addition, Dapper does not discuss a currently tuned frequency word being stored at a communication device. Withdrawal of the rejection is respectfully requested.

Regarding the rejection of claim 11, Wang does not teach storing a truncation error as discussed above. Withdrawal of the rejection is respectfully requested.

Regarding the rejection of claim 12, the references, including what Examiner characterizes as AAPA, do not teach the elements of the claims. Withdrawal of the rejection is respectfully requested.

Regarding the rejection of claim 13, similar analysis as applied to the rejection of claims 1-12 above apply. In addition, the section of Dapper cited by Examiner does not disclose the steps claimed in the claim. Examiner states that the although Dapper does not disclose only one truncation error (a correct statement), Examiner goes on to state that nevertheless, the steps performed according to the claimed method take place in the Dapper system (a conclusory statement). Examiner has not provided support for this asserted conclusion. In addition, similar analysis as discussed above regarding the rejection of claims 5 and 8 with respect to section [0533] of Wang (increasing bit number rather than reducing error through efficient software) apply to the rejection of claim 13. Withdrawal of the rejection is respectfully requested.

Regarding the rejection of claim 14, similar analysis as given above with respect to the rejections of claims 1 and 8 applies. Examiner incorrectly states that the Background of the present application teaches determining at a CMTS the actual upstream transmission frequency of the cable modem. The Background merely discusses that a DOCSIS CMTS may send an offset message that instructs a CM how much to adjust from a currently desired frequency. This is not the same thing as a CMTS determining what the actual frequency the cable modem is tuned to. Therefore, Dapper and the background do not render the claim obvious. Withdrawal of the rejection is respectfully requested.

Regarding claims 15, 16, 17, and 18, similar analysis as made above with respect to claims 9, 10, 11, and 12. Withdrawal of the rejections is respectfully requested.

The independent claims analyzed above patentably distinguish over the references as discussed above. All of the other rejected claims depend from these independent claims and therefore contain all of the limitations contained in their respective base claims. Accordingly, under MPEP §§2142 §2143.03, these dependent claims also patentably distinguish over the references and withdrawal of the rejection is respectfully requested.

SUMMARY

For all the reasons advanced above, Applicant respectfully submits that the application is in condition for allowance and that action is earnestly solicited.

If the Examiner believes that there are any issues that can be resolved by a telephone conference, or that there are any informalities that can be corrected by an Examiner's amendment please contact the undersigned at the mailing address, telephone, facsimile number, or e-mail address indicated below.

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